CLAIMS

What is claimed is:

1. A method for coating a substrate, comprising the steps of:
   providing a substrate;
   attaching a preform to the substrate, the preform comprising braze alloy and wear-resistant particles; and
   bonding the preform to the substrate to form a wear-resistant coating.

2. The method of claim 1, wherein bonding comprises metallurgically bonding the preform to the substrate.

3. The method of claim 2, wherein metallurgically bonding comprises at least one of brazing, welding, and soldering.

4. The method of claim 3, wherein brazing comprises heating the preform to melt the braze alloy of the preform.

5. The method of claim 1, wherein bonding comprises applying an adhesive to at least one of the substrate and the preform.

6. The method of claim 5, wherein the adhesive comprises at least one of epoxy, glue, and silicone adhesive.

7. The method of claim 1, wherein the preform is free of binder.

8. The method of claim 7, wherein the preform is formed by drying a slurry containing a liquid medium, a binder, said braze alloy, and said wear resistant particles to form a green sheet, and sintering the green sheet.

9. The method of claim 1, wherein the wear-resistant particles comprise a ceramic material.

10. The method of claim 9, wherein the ceramic material comprises at least one of a carbide and an oxide.

11. The method of claim 10, wherein the carbide comprises at least one of chromium carbide and tungsten carbide.

12. The method of claim 10, wherein the oxide comprises at least one of aluminum oxide and yttrium oxide.

13. The method of claim 1, wherein the wear-resistant particles comprise diamond.

14. The method of claim 1, wherein the wear-resistant particles have a maximum particle size of less than about 200 nanometers.

15. The method of claim 1, wherein the substrate comprises a component of a turbine assembly.

16. The method of claim 15, wherein said component is at least one of a nozzle, shroud, shroud hanger, pressure balance seal, low pressure turbine blade, high pressure turbine blade, and combustor component.

17. The method of claim 16, wherein said turbine blade comprises a tip shroud.

18. The method of claim 17, wherein attaching further comprises attaching said preform to said tip shroud.

19. The method of claim 18, wherein attaching further comprises attaching said preform to an interlock notch of said tip shroud.

20. The method of claim 15, wherein the turbine assembly is one of a gas turbine assembly and a hydroelectric turbine assembly.

21. The method of claim 1, wherein the wear-resistant particles comprise an alloy.

22. The method of claim 21, wherein the alloy comprises a cobalt-base alloy.

23. The method of claim 22, wherein said cobalt-base alloy is selected from the group consisting of the following compositions: (1) about 28.5 wt% molybdenum, about 17.5 wt% chromium, about 3.4 wt% silicon, balance cobalt, (2) about 22.0 wt% nickel, about 22 wt% Cr, about 14.5 wt% tungsten, about 0.35 wt% silicon, about 2.3 wt% boron, balance cobalt, (3) about 10 wt% nickel, about 20 wt% Cr, about 15 wt% tungsten, balance cobalt, (4) about 22 wt% nickel, about 22 wt% Cr, about 15.5 wt% tungsten, balance cobalt, and (5) about 5 wt% nickel, about 28 wt% Cr, about 19.5 wt% tungsten, balance cobalt.

24. A method for coating a turbine assembly component, comprising:

providing a substrate, wherein the substrate is at least one component of a turbine assembly;

attaching a preform to the substrate, the preform comprising braze alloy and wear-resistant particles, the braze alloy comprising at least one of a nickel-base and a cobalt-base alloy, and the wear-resistant particles comprising a material from the group consisting of a ceramic material and diamond; and

fusing the preform to said substrate.

25. A method for coating a turbine engine component, comprising the steps of:

providing a substrate, the substrate being selected from the group consisting of a nozzle, shroud, shroud hanger, pressure balance seal, turbine blade, and combustor component;

applying braze alloy and wear-resistant particles on the substrate, the braze alloy comprising a nickel-base or a cobalt-base alloy, wherein nickel or cobalt is the single greatest element of the alloy by weight, and the wear-resistant particles comprising a material from the group consisting of (i) $Cr_{23}C_6$, Cr_7C_3, Cr_3C_2, and combinations thereof, and (ii) a cobalt alloy, wherein said cobalt alloy forms a lubricious oxide film; and

heating the braze alloy to bond the wear-resistant particles to the substrate to form a wear coating on the substrate.

26. A method for coating a turbine engine component, comprising the steps of:

providing a substrate, the substrate being selected from the group consisting of a nozzle, shroud, shroud hanger, pressure balance seal, turbine blade, and combustor component;

attaching a preform to the substrate, the preform containing braze alloy and wear-resistant particles, the braze alloy comprising a nickel-base or a cobalt-base alloy, wherein nickel or cobalt is the single greatest element of the alloy by weight, and the wear-resistant particles comprising a material from the group consisting of (i) $Cr_{23}C_6$, Cr_7C_3, Cr_3C_2, and combinations thereof, and (ii) a cobalt alloy, wherein said cobalt alloy forms a lubricious oxide film; and

fusing said preform to said substrate.

27. A method for coating a turbine assembly component, comprising:

providing a low pressure turbine blade, said blade comprising a tip shroud having two correspondingly opposite Z-shaped interlock notches;

attaching a preform to said interlock notches of said tip shroud, said preform comprising braze alloy and wear-resistant particles, the braze alloy comprising at least one of a nickel-base and a cobalt-base alloy, and the wear-resistant particles comprising material selected from the group consisting of (1) about 28.5 wt% molybdenum, about 17.5 wt% chromium, about 3.4 wt% silicon, balance cobalt, (2) about 22.0 wt% nickel, about 22 wt% Cr, about 14.5 wt% tungsten, about 0.35 wt% silicon, about 2.3 wt% boron, balance cobalt, (3) about 10 wt% nickel, about 20 wt% Cr, about 15 wt% tungsten, balance cobalt, (4) about 22 wt% nickel, about 22 wt% Cr, about 15.5 wt% tungsten, balance cobalt, and (5) about 5 wt% nickel, about 28 wt% Cr, about 19.5 wt% tungsten, balance cobalt; and

fusing said preform to said blade.